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Development of a USMC Officer Assignment Decision Support System: Functional Description

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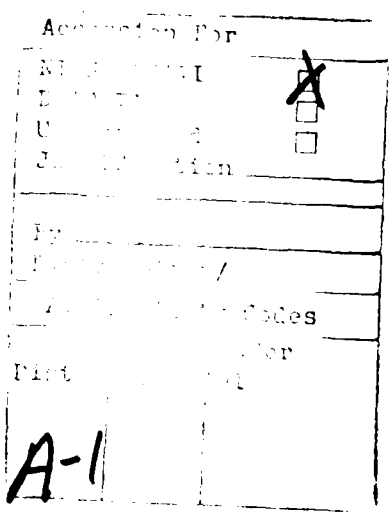

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This Functional Description (FD) was completed as part of the Life Cycle Management (LCM) process for development of an Officer Assignment Decision Support System (OADSS). The document provides information about system performance requirements, preliminary design considerations, and end-user impacts attributable to system implementation. Existing methods of officer assignment are summarized and proposed improvements are detailed. System benefits are grouped into four categories: functional improvements; improvements of degree; timeliness; and elimination/reduction of existing capabilities no longer required. Details pertaining to system input/output, data bases, failure contingencies, and security are also provided. It is recommended that a Data Requirements Document (DRD) be completed as the next phase in development of OADSS.

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FOREWORD

This report details system functions and performance requirements for the development of an Officer Assignment Decision Support System (OADSS). The primary objective is to develop an easy-to-use, interactive Decision Support System to improve current methods of officer assignment in the United States Marine Corps (USMC). Among the deficiencies in the current assignment system are the labor-intensive review of hard copy-based information, need for a comprehensive and centralized data base, and lack of standardization among officer Monitors in their assignment strategies. Monitors critically need interactive, computer-based support for assignment decisions because of the volume of assignment-related information available and the vast number of assignment alternatives to be weighed. This functional description establishes a basis for mutual understanding between the system user and developer and provides information relating to system functions, system performance requirements, preliminary design, and development of system tests.

This is the fourth in a series of reports that detail the "definition and design" phase of the USMC Life Cycle Management (LCM) process associated with OADSS. The research was conducted under work unit number M5402688WRRD8FY, Marine Corps Decision Support System for Officer Assignment, sponsored by the manpower Plans and Policy Division (MPI). This report is based upon the combined Functional Description/Requirements Document (FD/RD) that was submitted to MPI in August 1986.. The present functional Description has been completed to provide a guide for other researchers tasked with completing LCM documentation. Future reports will include a data requirements document, a project management plan, and system design specifications for OADSS development.

JOHN J. PASS
Director, Personnel Systems Department

Prior OADSS Publications:

Chatfield, R. E. (1988). Development of a USMC officer assignment decision support system: Needs assessment (NPRDC Tech. Note 88-50). San Diego: Navy Personnel Research and Development Center. (AD-A198353)

Chatfield, R. E., & Gullett, S. A. (1989). Development of a USMC officer assignment Decision Support system: Feasibility study (NPRDC Tech. Note 89-14). San Diego: Navy Personnel Research and Development Center.

Chatfield, R. E., & Gullett, S. A. (1989). Development of a USMC Officer Assignment Decision Support System: Economic Analysis (NPRDC Tech. Note 89-36). San Diego: Navy Personnel Research and Development Center.

SUMMARY

Background

Officer Monitors need support in their decision-making process due to the vast amount of assignment-related information to be considered and the number of assignment alternatives to be weighed. It is anticipated that a user-friendly, interactive Officer Assignment Decision Support System (OADSS) will help Monitors better implement USMC staffing policy, significantly reduce their clerical workload, and enhance the match of officers to billets.

Objectives

The objectives of this functional description were to provide a description of system functions that will serve as a basis for mutual understanding between the system user and developer; provide information about system performance requirements, preliminary design, and end-user impacts--including fixed and continuing costs--and establish a basis for the development of system tests.

System Summary

The system will be designed to support all existing functional capabilities as well as introduce a variety of new capabilities. Existing methods and procedures for officer assignment are summarized and proposed improvements (OADSS sub-systems) to the process are detailed. A summary of benefits associated with system implementation are grouped into the following categories: functional improvements (new capabilities); improvements of degree (upgrading of existing capabilities); timeliness (improved system response time); and elimination/reduction of existing capabilities no longer required.

Detailed Characteristics

Detailed characteristics pertaining to the system's overall performance requirements, functional areas, inputs and outputs, data base specifications, failure contingencies, and security are described. Included is an overview of the six proposed OADSS sub-systems as well as a discussion of issues related to the accuracy and validity of system output.

Design Details

A summary detailing how OADSS will satisfy all functional requirements delineated is presented. This section includes an overview of the system's proposed utilization, system functions, response time requirements, system flexibility, system throughput, and maintenance of OADSS data bases.

Environment

The current Automated Data Processing (ADP) environment as well as the environment proposed for system operation are described. Included is a discussion of such topics as support software, interface with existing automated information systems (AISs), and a summary of organization/operational/developmental impacts associated with system implementation.

Cost Factors

Cost factors associated with four alternative approaches to system development that were described in previous Feasibility Study (FS) and Economic Analysis (EA) documents were presented. The Benefit-to-Cost Ratio (BCR) indicated that Alternative 2, Existing System Enhancement, is the most viable course of action.

Recommendations

The following recommendations are made:

1. A Data Requirements Document (DRD) and associated Data Dictionary (DD) should be completed as the next stage in the "definition and design" phase of system development.

2. A "rapid prototyping" approach to sub-system development should be undertaken as means of minimizing system development time and ensuring the active participation of end users.

3. The DBMS software selected should be available for use on a variety of hardware platforms (i.e., mainframes, minicomputers, and microcomputers). This will promote system flexibility and ensure that programming will be as machine-independent as possible.

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INTRODUCTION

Background

The mission of the Officer Assignment Branch (MMOA), located at Headquarters, United States Marine Corps (HQMC) is to administer assignment of all Marine Corps officers (Colonel and below) in accordance with regulations, approved assignment policies, and criteria of the Commandant of the Marine Corps (CMC). Functions carried out in support of this mission include: issuing travel orders; classifying/reclassifying officers in occupational specialties; and assigning officers to educational, intermediate, and top level schools. The individuals within MMOA who make assignment decisions (subject to approval by higher authority) are referred to as officer "Monitors." Monitors have a very difficult job in that they are expected to accommodate both the manning requirements of the Marine Corps and the career/personal needs of officers via the assignment process. Performing this task requires concurrent consideration of the job dimensions of available billets and the skills and attributes of officers being assigned.

Monitors' first consideration in staffing is the "fill" of available billets while the next is the "fit" of officers to specific billets based upon their education, work experience, military occupational specialty (MOS), etc. The process of reaching an assignment decision may involve accessing on-line personnel data bases such as the Joint Uniform Military Pay System/Manpower Management System (JUMPS/MMS), reviewing Officer Fitness Reports (FITREPS) on microfiche, talking with constituents in person or on the telephone, or reviewing a number of other relevant sources of information. In conjunction with this, Monitors must also be mindful of established staffing policy, United States Marine Corps (USMC) manning levels, and the career development needs of individual officers when weighing assignment alternatives.

The idea for establishing an Officer Assignment Decision Support System (OADSS) came about because it was evident that Monitors need support in their decision-making process due to the vast amount of assignment-related information to be considered and the number of assignment alternatives to be weighed. It is anticipated that a truly user-friendly, interactive Decision Support System (DSS) will help Monitors better implement USMC staffing policy, significantly reduce the clerical workload of Monitors, and enhance the match of officers to billets.

The original effort to develop a DSS for Monitors was carried out by a contractor as part of the Officer Precise Personnel Assignment System (Officer PRE-PAS) in 1979. However, this work stressed an optimization approach to officer assignment and was terminated in the early concept development stage of the Life Cycle Management (LCM) process. A subsequent contractor effort to build OADSS, in 1981, was also terminated in the concept development stage as it also relied too heavily upon optimization techniques and was not sufficiently interactive. Both of these attempts were doomed to failure as the Marine Corps objected to any "black box" (i.e., optimization) approach perceived to automate the assignment process. The goal was to support Monitors in their decision-making, not to make assignment decisions for them.

The idea for developing the OADSS lay dormant until 1985 when support for a third attempt at system development became available at the Navy Personnel Research and Development Center (NPRDC). The project sponsor, Manpower Plans and Policy Division (MPI), specified that system design be carried out by Personnel Research Psychologists rather than Operations Researchers or Computer Specialists under the assumption that this would avoid yet another optimization-oriented approach that would prove unacceptable to the CMC. Also, it was MPI's assumption that the psychologists could better assess Monitors' needs and translate them into design of a system that was easy to access and truly user-friendly.

In compliance with the USMC Life Cycle Management Plan for Automated Information Systems (LCM-AIS), MCO-P5231.1, a combined Functional Description/Requirements Document (FD/RD) was submitted to MPI in August 1986. This document followed a combined Feasibility Study/Economic Analysis (FS/EA), which established that the operating environment for OADSS should be the upgraded AMDAHL mainframe located at the Marine Corps Central Design and Programming Activity (MCCDPA), Quantico. This Functional description is based upon the FD/RD submitted to MPI and has been completed to provided a guide for other researchers tasked with completing LCM documentation.

Objectives

The overall objectives of the functional description were to:

1. Provide a description of system functions that will serve as a basis for mutual understanding between the system user and the developer.

2. Provide information about system performance requirements, preliminary design, and end user impacts, including fixed and continuing costs.

3. Establish a basis for the development of system tests.

Project References

To supplement information gained from interviews, survey administration, and on-site observation, the following documents were reviewed:

1. Automated Data System (ADS) Plan for the Officer Precise Personnel Assignment System (Officer PRE-PAS), Potomac Research Incorporated and General Research Corporation, 15 September 1979. This report presents a proposal for development of the Officer PRE-PAS System and an assignment management information system.

2. Development of Specifications for the Officer Assignment Decision Support System, Andrulis Research Corporation, 25 February, 1981. This report presents a proposal for development of an officer assignment system based on optimization strategies.

3. Officer Staffing Goal Model (OSGM): Design Specifications, Decision Systems Associates, June 1978. This report contains a description of the function, logic, and data definitions of the OSGM at the time of development.

4. Marine Corps Personnel Assignment Policy, Marine Corps Order 1300.8M, 2 May 1984. This MCO implements Department of Defense policy and provides policy guidance relative to assignment and permanent change of station (PCS) of Marines.

5. Officer Assignment Branch Slating Guidance Memorandum, Director, Personnel Management Division, 18 October 1982. This memorandum provides guidance for the slating process, amplifies existing instructions, and establishes branch policies not covered elsewhere.

6. Joint Uniform Military Pay System/Manpower Management Systems Code Manual, Marine Corps Order P-1080.20, current to 11 December 1984. This manual contains definitions used in the JUMPS/MMS system.

Terms and Abbreviations

In the interest of readability and to facilitate comprehension, the terms, definitions, and acronyms used throughout this document are presented in Appendix A.

SYSTEM SUMMARY

Objectives

The primary objective of this project is to develop an easy to use, interactive Decision Support System (DSS) to free Monitors from manual, labor-intensive review of data elements. The system will allow Monitors to spend more time interacting with constituents, ensuring assignments comply with staffing guidance, and weighing assignment alternatives. OADSS will introduce a number of improvements into the

assignment process by addressing major deficiencies cited in the earlier Needs Assessment (Chatfield, 1988). The system will support all existing functional capabilities and provide the following new capabilities:

1. Streamlined and simplified procedures for updating the Officer Staffing Goal Model (OSGM) Dictionary.

2. Development of specialized training materials and instructional programs for Monitors.

3. Expanded availability of computer-based decision support informational resources, to include data elements critical for assignment decision-making not presently available.

4. Improved support for ad hoc query, retrieval, and manipulation of data elements.

5. Versatile report generator that supports timely, accurate management reports and special analysis requests.

6. Reduction in duplication of effort and reliance on time-consuming, manual procedures plaguing the present system.

7. Increased reliability and responsiveness of the computer system supporting the activities of Monitors.

8. Easy to use procedures for accessing data elements, downloading/uploading of files, and other computer-oriented activities.

9. Ease of maintaining and upgrading system hardware/software.

10. Support of inter-office communications (e.g., electronic mail).

In addition to the above described capabilities, there is a need to study "surge" requirements resulting from mobilization of the Marine Corps. In this scenario, normal assignment procedures are too slow. As part of OADSS, methods to improve the mobilization process will be carefully investigated. However, as work on this part of OADSS will be conducted by students from the Navy Postgraduate School (NPG), it will not be further discussed.

Existing Methods and Procedures

Figure 1 is a data flow diagram illustrating procedural steps and flow of information in the existing officer assignment system. The following sub-sections describe these procedures with each paragraph corresponding to a major step in the assignment process.

Provide Input to the OSGM Dictionary

Deriving staffing goals via the OSGM is theoretically, if not functionally (depends on when a Monitor assumes responsibilities), the first step in officer assignment. While MMOA-3 (Systems) is tasked with overall responsibility for developing the OSGM Dictionary and running the model, Monitors are accountable for providing input pertaining to billets falling within their designated Monitor Activity Code (MAC). While Monitors should review the entire Dictionary, they are specifically responsible for the following sections:

SECTION	FUNCTION
B1 MOS Definition Cards	Specifies the Military Occupational Specialties (MOSs) to be recognized by the model. Assigns each MOS one of 8 MOS type codes (e.g., Naval Aviator Fixed Wing (NAFW), Ground Combat Services Support (GDSS)). Affects processing of the OSGM Extract File.

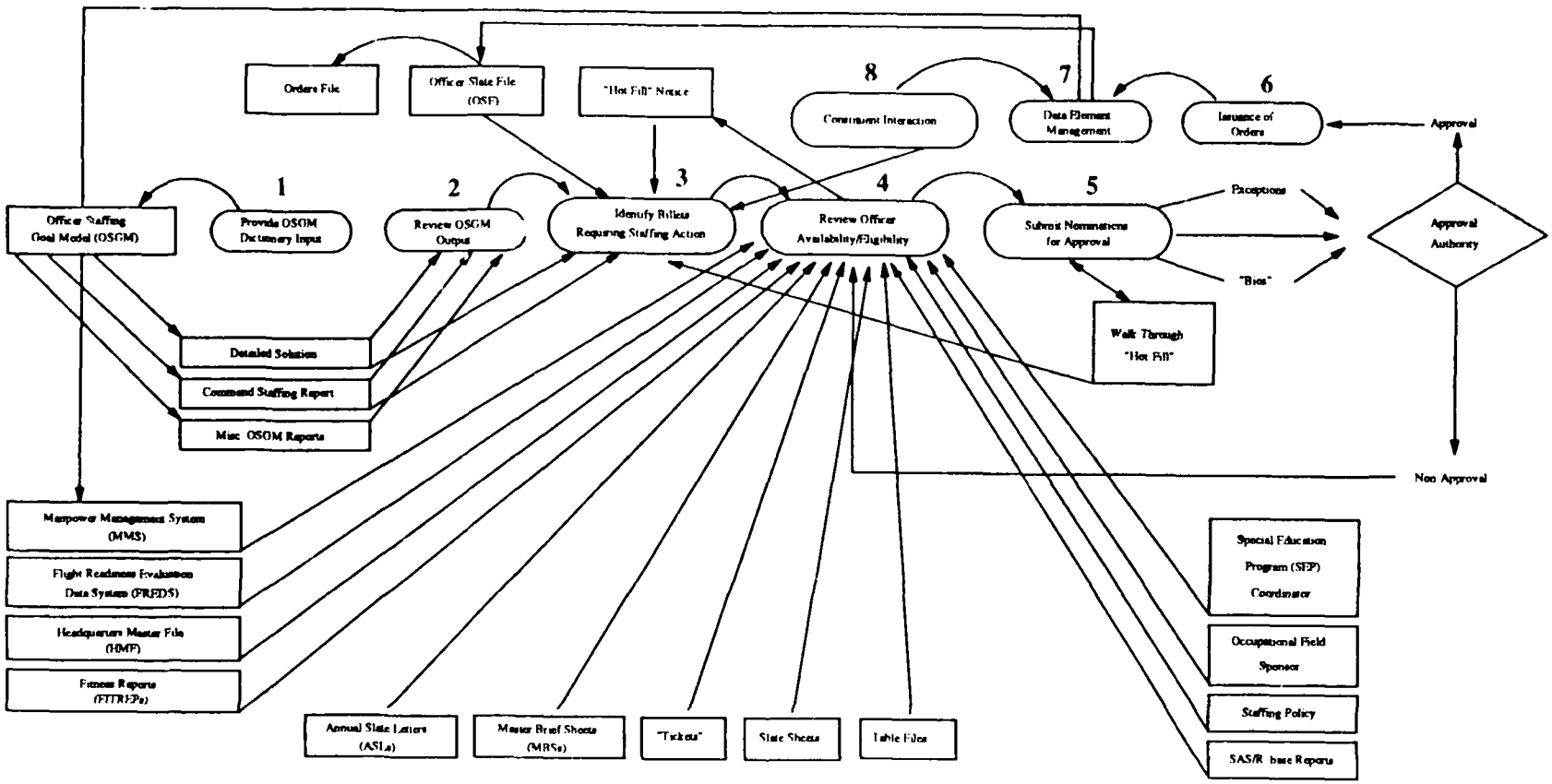

Figure 1. Information flow of current assignment procedures.

B2 Critical MOS Cards	Used during a mobilization run to modify the Staffing Precedence Level (SPL) input. Designates critical MOSs in mobilization so that the SPL is automatically raised to one (highest priority).
D1 Master Authorization	Directs allocation of Authorized Strength Report (ASR) authorizations control cards to individual Monitors.
E1 Billet Officer Description (BOD) Definition Cards	Defines general eligibility and desirability policies for allocated billets. Each BOD set is defined using from one to five cards. Establishes the desirable characteristics of officers to staff billets in terms of grade, MOS, experience, etc.
E2 Billet MCC Identification Set Definition Cards	Defines Billet Monitored Command Code (MCC) Identification Sets (BMISs) with each BMIS a collection of billets with the same MOS/MCC/grade and the same fill, eligibility, and desirability policies.
E3 Nonchargeable/ Training Requirement Definition Cards	Estimates the portion of the officer population which will be in a nonchargeable status and effectively removes them from the pool of available resources. Nonchargeable requirements have a SPL of zero so they have preference over other demands.

The OSGM Dictionary file contains approximately 10,000 80-byte records and is updated/modified in a slow, inefficient manner. Current editing facilities do not allow the file to be divided into sections for each Monitor. A hard copy listing of the file is provided Monitors for their input to be penciled in. MMOA-3 (Systems) collects the hard copy and edits the Dictionary file to accomplish the changes. Monitors must often be prompted for their input as the update procedure is generally not a high priority for them.

Review of OSGM Output

The OSGM is run three to four times per year (and twice for mobilization) to produce staffing goals. The OSGM produces staffing goals for Monitored Command Codes (MCCs) based upon authorized strength figures (from the Tables of Organization) that have been adjusted to conform with available resources. Resulting staffing goals represent an optimal distribution of officers to be targeted in the assignment process. One problem is that Monitors frequently "fix" resources by specifying Assigned Billet Grade (ABGRD) and Assigned Billet Military Occupational Specialty (ABMOS), which negates the attempt at optimal distribution of officers. Several reports are based on OSGM output with the Command Staffing Report (CSR) and "Detailed Solution" being the primary reports utilized by Monitors in the assignment process. The CSR provides a summary of officers staffed at each MCC and their slated replacements. The CSR also presents manning numbers for both the staffing goals and authorized strength. The Detailed Solution provides information on officers that the OSGM selected in determination of staffing goals. Although Military Identification Number (MID) is not provided to Monitors, Additional Military Occupational Specialties (AMOSs) can be used to identify specific officers used in staffing goal formulation because of their unique combinations.

Identification of Billets Requiring Staffing Action

Monitors work both ends of the assignment process by identifying billets that are coming open and officers nearing their Estimated Date of Departure (EDD). The CSR is particularly useful for identifying billets requiring staffing action and provides a date field for specifying inbound replacements. Monitors also identify "movers" by reviewing Officer Slate File (OSF) records, conversing with constituents, etc. Although staffing needs are often identified at the billet level, Monitors are authorized to staff only to the MCC level. Hence, the Commander of each MCC has the final authority as to where officers are actually assigned.

Review of Officer Availability and Eligibility

After billets requiring staffing action are identified, Monitors begin the process of reviewing officers' records to locate those most qualified to fill each billet. The first consideration is "availability," officers must be targeted for reassignment within the same time frame as billet availability. Officers satisfying the availability criterion are then evaluated for "eligibility," the extent to which their qualifications match those of the billet requirements. A variety of input is reviewed at this stage in an effort to achieve the best officer/billet match. This review stage is the key activity in assignment decision-making and is the stage at which OADSS will make a significant contribution. Monitors refer to several sources of information about officers when reviewing their billet-related qualifications. Among the information resources available to Monitors are computerized data bases, hard copy reports, and officers serving in assignment-related advisory roles (e.g., Special Education Program (SEP) Coordinator). The following section presents a brief summary of the information sources Monitors have available throughout the review process.

1. Officer Slate File (OSF)--Maintained by MMOA, the OSF is a primary source of officer information for Monitors. The OSF contains data pertaining to present command, future command, advance command, aviation qualifications, mobilization, etc. The OSF is the "working document" for Monitors as they frequently review and modify data elements via an interactive update process.

2. Joint Uniform Military Pay System/Manpower Management System (JUMPS/MMS)--The JUMPS/MMS is a collection of data bases maintained by MCCDPA, Kansas City, and provides the most comprehensive source of information on officers. The MMS portion is available on-line and updated daily in the field via a diary entry system.

3. Headquarters Master File (HMF)--The HMF is a weekly extract of the MMS and is maintained by MCCDPA, Quantico. The HMF provides the basis for development of the OSF and is a key source of information about officers. HMF data elements are updated only via the JUMPS/MMS diary entry system.

4. The Historical Master File--The Historical Master File (also sometimes denoted as HMF) is an archival copy of the HMF created on a one-for-one basis. Quarterly copies of this file are available dating back to 1972 and are useful for performing special analyses on a specific population of officers in years past. The file is processed and stored by the MCCDPA, Quantico.

5. Flight Readiness Evaluation Data System (FREDS)--The FREDS, maintained by the Aviation Department, is periodically accessed but pertains only to aviation-qualified officers. Data elements available include aviation service entry date, operational flying time, prior flying status billets and other aviation-relevant information.

6. Table Files--Table files are available in the MMOA System Library and may be interactively accessed. These files contain a variety of information periodically referenced by Monitors. Among the 20 table files currently available are those pertaining to exception codes, joint service billets, service school codes, etc.

7. Statistical Analysis System (SAS) and R:base 5000 Output--Monitors frequently request MMOA-3 (Systems) to produce analyses that cannot be performed with the existing data base management system (DBMS), ADABAS NATURAL. Both SAS on the mainframe and R:base 5000 on microcomputers are used for these special requests. Output consists of a hard copy report or a specially formatted computer file.

8. Officer Fitness Reports (FITREPs)--FITREPs are managed by MMOS and reviewed to ascertain officers' job history and historical level of performance. Monitors do not currently have computer access to FITREPs and must review using a microfiche reader.

9. Master Brief Sheets (MBSs)--MBSs are also produced by MMOS and provide basic identifying data along with a summary of FITREPs on file (sections A and B only). MBSs also include information on officers' decorations, military and civilian education, foreign language proficiency, and other selected HMF data. Computer access to MBSs are not presently available so Monitors must review them in hard copy form.

10. "Ticket" Folder--Monitors maintain a folder of information on each officer that is referred to as their "ticket." A ticket contains a variety of information, including past MBSs, administrative action forms, and miscellaneous Monitor notes from conversations with officers.

11. Annual Slate Letter (ASLs)--The ASLs, often referred to as the "Dear Major" letters, are sent by Monitors to constituents with the rank of major and above (i.e., field grade) on an annual basis. Content of the slate letter varies among Monitors but sections typically include a listing of projected vacancies for the upcoming year, a duty preference questionnaire, and a brief history of military history to be completed by the officer. ASLs are stored in an officer's ticket and there is presently no computer-based storage of responses.

12. Slate Sheet--The Slate Sheet is a brief, one page questionnaire that constituents complete when Monitors are conducting on-site visits. The sheet provides officers with an opportunity to request specific future assignments while asking them to provide justification for their requests.

13. Marine Corps Staffing Policy--Monitors are required to follow specific published staffing policy such as that promulgated in Marine Corps Order 1300.8M. Published directives cover such diverse areas as assignment of women Marines, prescribed tour lengths, Permanent Change of Station (PCS) transfer rules, etc.

14. "Blue Book"--The "Blue Book" or MANMC P-1005 is published every year and contains a variety of promotion-related data. Monitors reference the publication primarily to review an officer's lineal reference number in grade. This number, in conjunction with Lineal Control Number (LCN) on the HMF, is useful for predicting promotion. Additional information includes date of present rank, pay entry base date, and date of rank of first commission in the Marine Corps.

15. Special Education Program (SEP) Coordinator--Monitors must often coordinate assignments with the SEP Coordinator in MMOA-3. For example, officers with a SEP-earned (i.e., any 9600 series) Additional Military Occupational Specialty (AMOS) are legally obligated to serve two "payback" tours.

16. Occupational Field Sponsor--For most MOSs there is an HQMC occupational field sponsor who provides specific billet requirements and recommendations regarding qualifications of officers to fill billets. The sponsors serve in an advisory role and do not have authority to make assignments.

17. Monitor/Constituent Interaction--Monitors frequently receive telephone calls and correspondence from officers in the field and drop-in visits by constituents visiting HQMC. Discussions cover such topics as duty preferences, career progression, and personal considerations impacting on assignments (e.g., child with a medical problem where treatment is available only in a few locations).

18. Subjective Input--In addition to reviewing formalized data sources, Monitors always maintain a good measure of subjective input in the assignment process. They must predict future promotion, assess if assignments are career enhancing, consider constituents' personal factors, etc., which are considerations that cannot be adequately quantified. According to official Marine Corps staffing guidance, the responsibility of Monitors is to fill billets, not to find the best assignments for their constituents. Although Monitors do their best to comply with constituents' duty preferences, this cannot be their primary objective in making assignments. Monitors' assignment goal hierarchy is as follows:

a. To meet the needs of the Marine Corps
b. To meet the career needs of the individual
c. To meet the desires (duty preferences) of the individual

Submit Assignment for Approval

After a Monitor has tentatively identified an officer for assignment, a formal nomination must be reviewed and approved by the proper authority. Nominations of company grade officers are approved at the section level, field grade officers at the branch level, Lieutenant Colonel and high visibility (regardless of rank) nominations by the head of the Personnel Management Division (MM), and Colonel nominations at the CMC level. Assignments that represent "exceptions" to staffing policy (e.g., a second overseas accompanied tour) must be identified and approved. In addition, several types of nominations require that a Brief Digest

of Military History, or "Bio," be prepared to summarize officer qualifications. Following approval of a nomination, Monitors update data elements of the "future command" section of the OSF. A program is run daily on the OSF to flag new assignments so the Orders File maintained by the Enlisted Assignment Branch (MMEA) can be updated and the orders writing procedure initiated.

Issuance of Orders

Orders writing will soon be completely carried out by the Automated Orders Writing Procedure (AOWP) with orders written directly on printers at cognizant commands. However, unlike assignment of enlisted personnel by MMEA, AOWP is not yet operational in MMOA. The output of the current procedure is a Naval message providing authority to cognizant commands to cut the orders. Monitors are typically not closely involved with issuance of orders as these matters are delegated to their assistants and support personnel. Monitors are aware that the PCS has been accomplished when diary entries to the MMS are made at the receiving command and the Future Monitored Command Code (FMCC) automatically becomes that of the Present Monitored Command Code (PMCC).

Data Element Management/Constituent Interaction

In addition to stages in the assignment process detailed in preceding sections, there are several ongoing procedures conducted by Monitors. For example, Monitors manage (e.g., update/delete) data elements that are maintained in computer files, most notably the OSF. Most Monitors simply determine the nature of the update and delegate the responsibility of updating the OSF to their assistant. This duplication of effort could be eliminated if Monitors actually updated the OSF themselves as changes arise. Another ongoing Monitor activity is interaction with constituent officers. This interaction is a major component of the Monitors' job, whether it be via telephone, on-site visit, or constituent visit. Constituent interaction takes precedence over all other activities and can often constitute a large part of a Monitor's workday.

Proposed Methods and Procedures

The OADSS project is a broad-based effort to help make Monitors' jobs easier and more efficient. The main emphasis of the system is in providing Monitors with easy-to-use methods for querying an extensive range of assignment-relevant data elements, retrieving officer records, entering and editing officer/billet data, and generating reports. It is imperative to note that the system will serve as a decision- aid but will not automate officer assignment. Besides this primary function, the system will provide enhanced, interactive maintenance of the OSGM Dictionary and provide improved Monitor training. All components of OADSS will be developed on a prototype basis with transition to full system implementation contingent upon prototype performance and acceptance. Due to the scope and diversity of deficiencies that must be addressed, OADSS will be developed as a series of "modules" or sub-systems. While tied to the overall objectives of the system, each module will be developed and tested on an individual basis. The order of module development will be prioritized by the needs of MMOA.

To best address proposed methods and procedures, each of the six modules currently planned for development is discussed below.

1. SEP Coordinator Module--The Special Education Program (SEP) Coordinator is a Monitor that does not actually have his own constituent population. That is, officers participating in SEP are spread throughout MOS categories, and hence across Monitor populations. The SEP Coordinator can only "suggest" to cognizant Monitors that officers be given SEP assignments. The SEP Coordinator does not have a computer-resident data base comprised of information on SEP officers and SEP billets. Because of this, all of his work is done via a slow, manual process. The goal of this module is to build a data base tailored to the specifications of the SEP Coordinator and to provide easy-to-use methods for data input, ad hoc query, and report generation. In addition, methods will be developed to assist with determination of SEP selection quotas for MOS groups based upon projected out-year shortfalls. Development of this module currently is the greatest priority within MMOA.

2. OSGM Dictionary Interactive Maintenance Module--The current method of updating the OSGM Dictionary is hard copy-oriented, time-consuming, and error prone. Additionally, editing facilities are

extremely poor. This module will provide methods for Monitors to interactively update their portion of the OSGM Dictionary and for the OSGM Officer to check and concatenate their collective input. Where feasible, field and card order error checking will be implemented to eliminate the unreliable visual checking now used. Interactive maintenance will encourage Monitors to actively manage billets under their cognizance and promote derivation of more realistic, accurate staffing goals.

3. Officer Promotion Data Module--Likelihood of promotion is an important consideration in matching officer to billet. That is, it is inappropriate to assign a Captain to a Captain's level billet if he is likely to be promoted to Major a few months later. Therefore, Monitors make an "educated guess" about officers' promotion potential. Conversely, certain billets cannot be filled by officers who have been passed over for promotion. This module is designed to provide ready access to the promotion history of officers; clearly an improvement to simply "Blue Book" data. This information will reduce guesswork in predicting possible promotions and hence reduce resultant officer pay grade/billet paygrade discrepancies.

4. Annual Slate Letter/Monitor Note Module--As discussed earlier, ASLs are forwarded to officers with the rank of Major and above. While the format of the letter varies among Monitors, the key assignment-related information requested is about the same. For example, prioritized duty preferences, geographical area preferences, information about dependents, etc. is always collected. While data collected with ASLs are quite valuable, their utilization is limited because they exist in hard copy form only. Hence, Monitors often do not make the effort to sift through hundreds of letters to locate individuals with specific qualifications or preferences. This module is designed to make ASL information computer-resident as part of the OADSS data base. As part of this process, data elements will be established to allow Monitors to enter detailed assignment-relevant notes not possible in the restricted "Notepad" of the present OSF. Automation of ASL information and additional Monitor notes will significantly expand the scope of data elements available for review via the DBMS.

5. Improved Data Base Access Module--The establishment of simple, user-friendly access to data elements is critical to the success of OADSS. Currently, the majority of Monitors do not utilize the DBMS (ADABAS NATURAL) because learning it is difficult and time-consuming. The purpose of this module is to introduce a DBMS that employs "applications generator" technology. This tool queries the user about what they want to accomplish in a step-by-step interactive procedure. Meanwhile, the applications generator builds the program automatically in the background. This mechanism allows the user to perform even complex analyses quite readily and does not require learning of DBMS syntax/language. In addition to this technology, the scope of data elements that are computer-accessible will be expanded.

6. Computer-Aided Monitor Training (CAMT) Module--As detailed in the earlier Needs Assessment (Chatfield, 1988), training of Monitors is ill-structured and not comprehensive. Hence, high variability in "assignment styles" exists among Monitors and USMC staffing policy is not consistently applied. A prototype Computer-Aided Monitor Training (CAMT) will be built to provide a computer-based, indoctrination program for Monitors. The CAMT module will cover such topics as: OSGM philosophy and procedures, USMC staffing policy, the role of the Monitor, the scope of available data elements, and the assignment approval process (including "exceptions"). Monitors will complete CAMT lessons prior to assuming their new duties. Follow-up refresher training will be provided to remind Monitors of critical assignment considerations and to assess their knowledge base. All computer-based training will be supplemented by hard copy material where appropriate.

The flow of information in the assignment process will closely approximate what currently exists (see Figure 1). However, a wider range of data elements will be computer-resident and more easily accessed. The primary goal of the system is to identify "candidate" officers for filling a billet based upon Monitors' specification of skills, training, pay grade, etc. This process is illustrated in Figure 2, which details the information flow of proposed assignment procedures. Note that the Monitor can supplement OADSS output with additional information from non-OADSS data elements (e.g., Master Brief Sheets or "tickets"). Reduction in the number of candidates can either be accomplished by returning to OADSS or by in-depth manual review. In either case, it is evident in Figure 2 that the final nomination of an officer for assignment is still carried out by the Monitor, not the system.

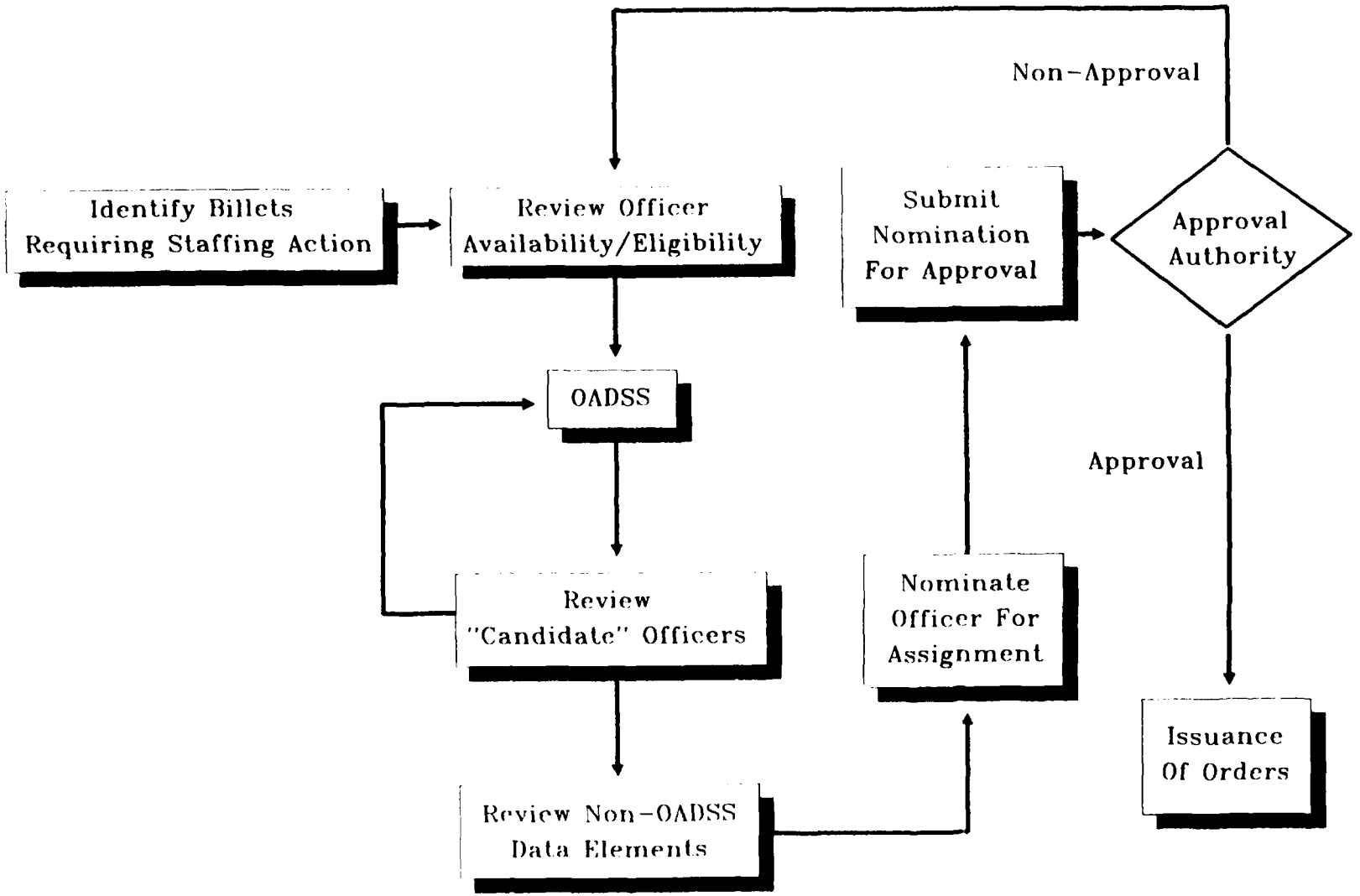

Figure 2. Information flow of proposed assignment procedures.

Procedural Modification/Elimination

Implementation of OADSS will result in the modification or elimination of several existing procedures. These changes are described below:

1. Manual Data Element Review--Initial review of constituents' qualifications, duty preferences, and other assignment-related factors now typically performed manually will be automated in OADSS. That is, the system will provide a list of "candidate" officers for filling a billet based on Monitor-specified criteria.

2. Manual Maintenance of OSGM Dictionary--One of the OADSS modules will provide for on-line interactive maintenance of the OSGM Dictionary by Monitors. This will replace current manual, hard copy-based procedures and thus reduce the time required of the OSGM Officer to prepare for a model run.

3. Fragmented SEP Management--One of the system modules will build a specialized data base for the SEP Coordinator. This data base and associated procedures for data entry, ad hoc query, and report generation will replace the fragmented, manual procedures now used for SEP management. By combining information about SEP Billets and SEP officers, the data base will centralize key management data.

4. Hard Copy Access to Annual Slate Letters--ASL responses will be entered into the computer for ready, automated access. By making these data elements computer-resident, Monitors will be able to quickly and comprehensively review information without randomly sifting through hundreds of hard copy ASLs.

5. Reference to the "Blue Book"--Monitors will no longer need to refer to the "Blue Book" for just a limited amount of officers' promotion data. Access to officers' entire promotion history will be available and this will be very helpful for predicting forthcoming promotions.

Summary of Improvements

This paragraph summarizes benefits to be realized from introduction of the proposed system. Benefits are grouped into four categories: functional improvements (new capabilities); improvements of degree (upgrading of existing capabilities); timeliness (improved response time); and elimination/reduction of existing capabilities no longer required.

Functional Improvements

1. SEP Data Base -- A data base comprised of information about SEP-qualified officers (AMOS of 96XX) and SEP billets will be built to the specifications of the SEP Coordinator. In addition, user-friendly procedures will be developed for on-line data entry, ad hoc query, and report generation. This implementation will reduce the clerical workload while also assisting in deriving MOS category selection quotas for the program based upon projected future needs.

2. Interactive OSGM Maintenance -- On-line, interactive maintenance of the OSGM Dictionary by Monitors will: (a) reduce the time and effort required of the OSGM Officer to assemble the Dictionary for a model run; (b) reduce the percentage of faulty input records by employing error checking procedures; (c) encourage Monitors to actively manage their portion of the Dictionary; and (d) lead to more accurate staffing goals.

3. Automation of Annual Slate Letter/Monitor Notes--Entering ASL responses into a computer-resident data base will allow Monitors to quickly and easily access a wealth of information now extant only in hard copy form. Also, the opportunity for Monitors to enter "free form" notes that are much more detailed and extensive than now permitted in the OSF "Notepad" will be of great benefit.

4. Computer-Based Monitor Training--Computer-based indoctrination training will both expand and introduce structure to the current training paradigm. This training will cover a variety of critical issues related to the assignment process and will help Monitors to become comfortable with using a computer for accessing OADSS.

5. Data Element Access in the Field--The feasibility of Monitors carrying portable computers with them during on-site visits with constituents will be assessed. This capability will allow Monitors to update data elements (to be uploaded to the mainframe/minicomputer upon returning to HQMC) in the field and provide immediate feedback to constituents' questions concerning assignment alternatives.

Improvements of Degree

1. Improved Data Base Access--A DBMS will be introduced that simplifies data base access (e.g., ad hoc query, report generation) by employing "applications generator" technology. This capability will encourage Monitors to make use of computer-based decision aids and abandon the current, labor-intensive manual processing of assignment-related information.

2. Expanded Scope of Data Elements--A number of "new" data elements will be made computer-accessible for review. Promotion history, Section A of the FITREP, and other critical information will be provided on-line by OADSS. This type of data is now available only in hard copy form or accessed via the computer with the assistance of MMOA-3 personnel.

3. Mobilization--Alternatives to improving mobilization surge requirements will be evaluated to improve the timeliness of this process. Models will be developed to provide concept development support for future efforts in this area.

Timeliness

1. Faster System Response Time--The projected procurement of additional mainframe equipment and an efficient layout of the OADSS data base will significantly enhance system response time. Response time decrement in the current system is so extreme that many Monitors have completely abandoned using the computer.

2. Better "Customer Service"--Improved system response time and user-friendly ad hoc query facilities will allow Monitors to provide constituents with rapid and timely feedback to assignment-related questions.

3. Decrease in Processing Time--Automation of procedures currently conducted manually will result in decreased processing time for assignment decisions. Information will be available on-line for rapid system access.

Elimination/Reduction of Existing Capabilities

1. Reduction of Manual Processing--OADSS will perform many activities (e.g., ad hoc query, data retrieval) now performed in a slow, manual labor-intensive manner. While manual processing will not be completely eliminated, it will be confined to the final nomination step.

2. Elimination of Duplication in Effort--The new system will eliminate duplication of effort now problematic. For example, many Monitors note changes in the "Paper Slate" which their assistants are required to enter in the OSF. OADSS will encourage the Monitor to directly modify the OSF as system response time will be greatly improved.

Summary of Impacts

The following paragraphs describe the anticipated impact on the user environment.

Organizational Impacts

This section describes the organizational impact on users following system implementation.

1. Personnel Responsibilities--Two types of users will be using OADSS: the Data Base Administrator (DBA) and MMOA personnel. The DBA is primarily concerned with technical support and

operating/maintaining the Automated Data Processing Equipment (ADPE). MMOA personnel, principally Monitors, are the primary users of the system. Monitors will use the system to update records, perform ad hoc queries, print reports, etc. Monitors and their assistants will have the responsibility of entering and maintaining all data elements not currently computer-resident. While this data entry requirement involves some time and effort, the substantial reduction in manual, time-consuming procedures now used will more than offset this added responsibility. Other HQMC personnel may be permitted limited access to OADSS, however, access will be closely monitored by the DBA.

2. Skill Requirements--As stated in earlier LCM documents, the present officer assignment system is characterized by slow, manual, hard copy-dependent procedures. The new system will substantially reduce this manual orientation by providing computer storage and access for additional key data elements. While OADSS will be menu-driven and user-friendly, users will be required to gain some competence with computers. Specifically, users will need to know how to operate Video Display Terminals (VDTs), printers, and other peripheral devices. However, the responsibility for integrating ADPE, performing system backups, and providing for system security will remain under the purview of the DBA.

3. Training of Personnel--Training of users will be divided into two areas: (a) training about Monitor responsibilities; and (b) training in use of OADSS procedures (e.g., report generation). Training will be provided in the form of on-line tutorials and supported by hard copy training materials.

4. Training--Computer-based training will help orientate new Monitors as to their role and responsibilities. This training will also serve to "standardize" assignment-making decision styles among Monitors.

Operational Impacts

This section describes the operational impact on users following system implementation.

1. System Interface--OADSS is designed to be accessed interactively by users. The system will provide methods to input data, print reports, respond to ad hoc queries, and quickly retrieve specified data elements. The system will be accessed via VDTs located throughout MMOA.

2. Operating Procedures--The procedures used in determining officer assignments will not change appreciably with the exception of increased utilization of computer resources. OADSS will be used as a tool in the Monitors' decision-making process and will promote standardized assignment practices. The DBA will be responsible for coordinating operation/maintenance of equipment, performing system maintenance, assigning user passwords, and a variety of other system-related tasks. Of course, field-based access to assignment information via portable microcomputer also significantly improves service to constituents.

User Development Impacts

This section describes the user development impact on users following system implementation.

1. Training--As with the introduction of any new automated system, user training is critical to successful implementation. The scope of the training will be principally determined by the extent of system introduction in the prototype process. This training will include operation of ADPE and utilization of OADSS with user-friendly, on-line methods used where feasible. Training will be augmented by hard copy material and on-the-job training by experienced Monitors.

2. Manpower Requirements--Additional manpower will not be necessary during OADSS development as the bulk of the work will be carried out by NPRDC. However, MMOA personnel and MCCDPA personnel will be closely involved with system installation and testing.

3. System Documentation--NPRDC is responsible for drafting user documentation for the system. MMOA has the responsibility for drafting documentation pertaining to system usage policies, designation of authorized users, system security, etc.

4. Systems Transition--The system will undergo extensive testing and evaluation to ensure that it effectively meets design specifications. Once this phase is completed, the System Sponsor (MPI) and MMOA will have to decide whether or not to transition to full system implementation. This transition, if approved, will be phased in over approximately a 3-month period.

5. Site Preparation--OADSS will introduce a limited amount of new ADPE within MMOA. As all equipment will operate in a normal office environment, minimal site preparation is required.

Assumptions and Constraints

This paragraph describes assumptions and constraints that will affect development and operation of the proposed system.

1. The total number of personnel within MMOA is fixed; however, their qualifications (i.e., MOS) may be modified.

2. There is potential for adding one or two reserve personnel with Data Systems experience to MMOA during the system installation and evaluation phase.

3. The recommended alternative (Existing System Enhancement) in the previous Feasibility Study and Economic Analysis will be the actual system configuration used. That is, the existing mainframe environment and microcomputers at the MMOA level will be used for OADSS implementation.

4. Funds are available to develop and implement OADSS, including procurement and maintenance of ADPE.

5. Work on evaluating mobilization factors and improving the OSGM Dictionary will be conducted by students at the Naval Postgraduate School (NPS).

6. The OSGM Interactive Dictionary Maintenance Module will interface with the MISS project being conducted by CDC.

7. A DBA or Systems Controller will be appointed from MMOA-3 and will act as the liaison with the Marine Corps Central Design and Programming Activity (MCCDPA), Quantico.

8. Procurement of ADPE (RFPs, contracts, etc.) will be the responsibility of HQMC. NPRDC will assist and provide supplementary information as required.

9. Security considerations for OADSS must meet or exceed those of the AISs accessed in the current assignment system.

10. No loss of operational capability can be permitted during system implementation due to the operations tempo of assignment activities.

11. Improvements introduced by OADSS must continue to meet applicable laws as prescribed by the Department of Defense (DoD) and the Department of the Navy (DoN) regulations.

DETAILED CHARACTERISTICS

Detailed characteristics of the system's performance requirements, functional areas, inputs and outputs, data base specifications, failure contingencies, and security are discussed.

Specific Performance Requirements

The performance requirements for the proposed system are outlined below.

1. On-line Access--Automated access to a wide range of assignment-related data elements to replace current manual processing.

2. On-line Edit/Update--On-line, interactive editing and updating of the OADSS data base via menu-driven, user-friendly methods.

3. Interface Between MMOA Sections--Automated interaction between MMOA functional areas (sections) located in geographically separate offices. This interaction pertains to both data base access and electronic mail.

4. Improved System Response Time--Processing time for data base access in the assignment process will be reduced thanks to improved system response time.

5. Applications Generator--Data base access for ad hoc query, data retrieval, and report generation will be accomplished using "applications generator" technology, which eliminates the need to learn complex DBMS syntax.

6. On-line Security--Access to the OADSS will be controlled with user accounts and password security. Data base access will be coordinated by the DBA and access control extended to the "value within field" level.

7. On-line Training--A Computer-Aided Monitor Training (CAMT) module will be developed to familiarize users with the system and also to provide a comprehensive indoctrination to the role of Monitor.

8. On-line Maintenance of the OSGM Dictionary--On-line, interactive maintenance of the OSGM Dictionary file with built-in error checking will be provided.

Accuracy and Validity

The accuracy and validity requirements for the proposed system are outlined below.

1. Accuracy Requirements of Math Calculations--The proposed system will perform standard mathematical calculations (addition, subtraction, multiplication, and division) in both floating point and integer modes. More complex statistical procedures such as correlation and regression are likely to be included in the DBMS, as well. System access summaries pertaining to the number of records processed, modified, etc. will be provided.

2. Accuracy Requirements of Data--OADSS will automatically verify/validate data entered to ensure that it is in an acceptable format, falls within a specified range, and is a valid data element. In addition, codes for selected fields (e.g., MOS, MCC) will be validated against a table of acceptable entries.

3. Accuracy of Transmitted Data--Data transmitted to or from the system will be verified as described above.

Timing

The timing requirements of the proposed system are discussed below.

1. Data Availability--Following input of data to the system, availability of output is essentially instantaneous. That is, system input and output procedures will operate on an on-line basis to promote rapid system response.

2. Query Response Time--The system response time to user ad hoc query will be minimized as much as possible by ensuring an efficient data base design. In addition, planned upgrades in the mainframe environment conducted at the MCCDPA, Quantico will substantially improve system response time.

3. Functions--OADSS will be developed such that functions are not sequential. That is, the modular approach to system development will allow access to a sub-system at any time via the Main Menu.

4. Response Time Decrement--Response time decrement under periods of heavy usage is anticipated. However, due to the nature of the assignment process, it is unlikely that more than 50 percent of the Monitors will be performing CPU-intensive tasks concurrently. Therefore, many of the computer-related tasks carried out by Monitors will not be impacted.

System Functions

This section provides amplifying information for the proposed methods and procedures previously detailed. These functions will be related primarily to requirements delineated in the "Specific Performance Requirements" section. Figure 3 illustrates the modules presently slated for development.

1. SEP Coordinator Module--This module entails development of a data base to specifications of the SEP Coordinator, which will include both SEP billet and SEP officer information. Rapid, easy-to-use methods for on-line entry/update of data, ad hoc query, and report generation will be provided, as well. Input will be screened and verified to maintain data base integrity and clear, concise error messages will be provided as user feedback. Data will be accessible in a timely fashion and any module will be selectable from the module's Main Menu.

2. OSGM Dictionary Interactive Maintenance Module--This module will provide Monitors with the capability of performing on-line, interactive maintenance of the OSGM Dictionary File. Both card order and field level error checking will be implemented to minimize processing errors during running of the OSGM. Hard copy output of Monitors' portions of the Dictionary will be made available for review. All maintenance transactions will be flagged with the file not actually being updated until the input has been reviewed by the OSGM Officer.

3. Officer Promotion Data Base Module--This module will provide on-line access to the promotion history of Marine Corps officers. This data is currently available on a microcomputer-based LAN in Manpower Management Promotions Division (MMPR) but is not available now to MMOA. Promotion history will be retrieved based upon either name or MID and will be available only in read-only format. As with the other modules, this module can be accessed at any time from the OADSS Main Menu.

4. Annual Slate Letter/Monitor Notes Module--This module will make ASL information computer-resident as part of the OADSS data base. User-friendly methods of data entry, ad hoc query, and report generation will be provided. In addition to these data elements, opportunity for the Monitor to enter detailed, assignment-related notes will be provided.

5. Improved Data Base Access Module--The establishment of simple, user-friendly procedures to access OADSS data elements will be made by implementing applications generator technology. This approach involves the DBMS "building" programs via step-by-step query of the user. This procedure allows the user to conduct even complex queries without needing to learn DBMS language and syntax. Errors will be eliminated as the DBMS will create programs flawlessly. Response time for data base access must be very rapid if the system is to be readily accepted by the Monitors.

6. Computer-Aided Monitor Training (CAMT) Module--The prototype CAMT will be developed to provide MMOA with a comprehensive, computer-based indoctrination process for Monitors. This module will provide Monitors with an extensive knowledge base in assignment-related matters while additionally promoting consistency among Monitors in assignment strategies. Also included will be an introduction to OADSS operation with the opportunity to conduct ad hoc queries and generate reports on a sample data base.

Failure Contingencies

This section discusses alternative courses of action that may be taken to carry out officer assignment procedures in the event of system failure.

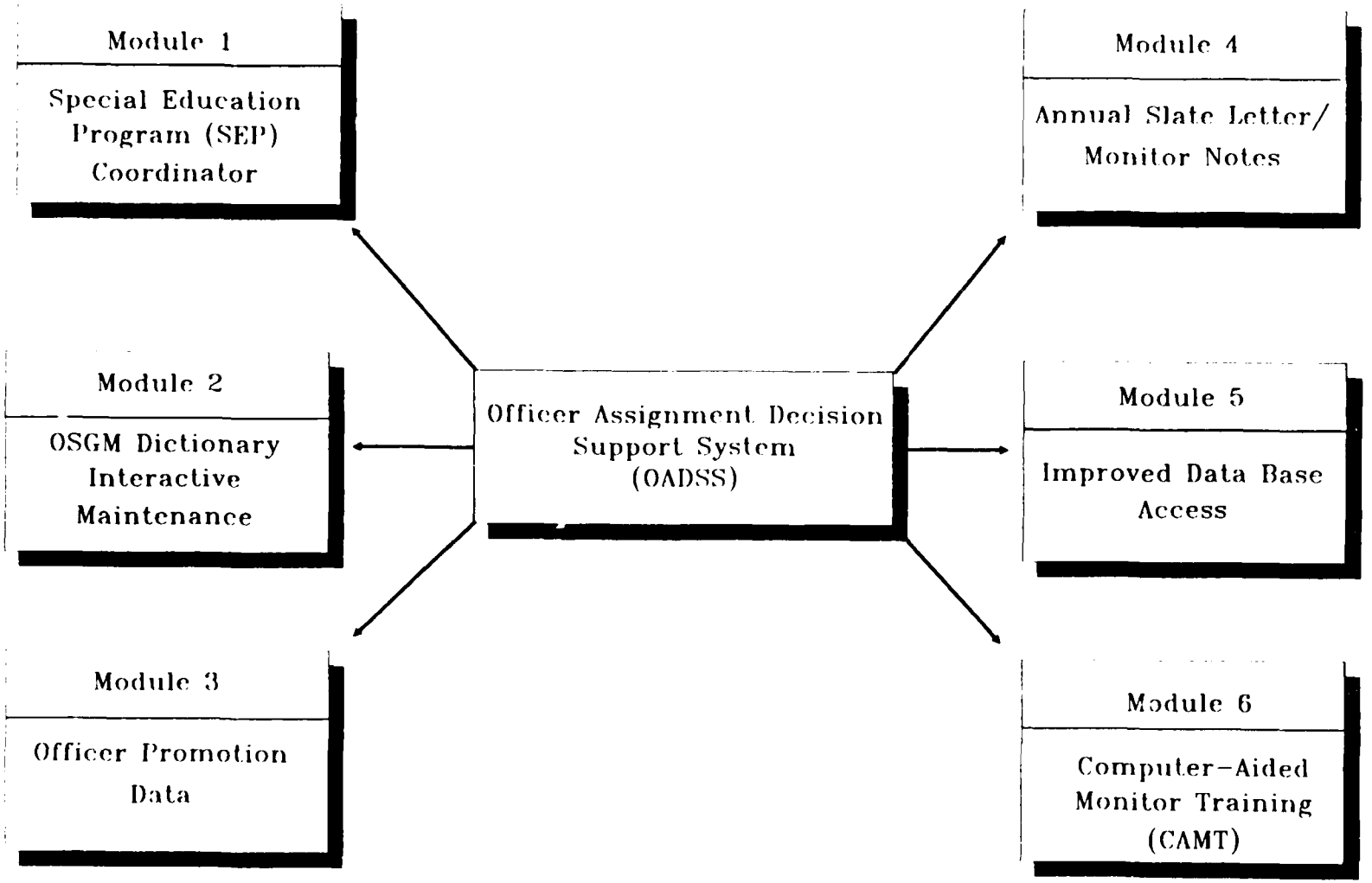

Figure 3. Proposed modules of the officer assignment decision support system.

1. Back-up--It is anticipated that virtually all system failures will be corrected within a 24-hour period (one workday). While the system is inoperative, Monitors can simply return to using manual, hard copy-based procedures. However, it should be noted that not all data elements contained in OADSS will be available since many are not now computer-resident. For example, ASL information will be available only in original hard copy form.

2. Fallback--A complete and lengthy failure of OADSS ADPE and associated software is highly unlikely. However, in this event, Monitors could rely on hard copy output such as the Work Slate to carry out assignment responsibilities.

Security

Data elements contained in the OADSS data base are quite sensitive as they provide information about an officer's job performance, dependents, promotion history, etc. Therefore, procedures must be developed to strictly control system access.

1. Access Control--Access to the OADSS data base will be controlled via distribution of account numbers and associated user passwords. All accounts/passwords will be controlled by the DBA (and the MCCDPA) and security features of the DBMS will be used to control data access at the file, field, and value within field levels.

2. Output Control--Like access control, strict output control will be employed by OADSS. DBMS features used for ad hoc query and report generation will also be used for output control, as well. Output of sensitive data elements will be limited to authorized personnel only. Again, control will be extended to the value within field level.

Although OADSS is designed to support MMOA, there may be occasions for other HQMC branches to need access to the system. In such instances, written permission for system use must be obtained from the Head, Officer Assignment Branch, and access will be limited to an "as needed" basis by the DBA.

DESIGN DETAILS

This section focuses on a description of how OADSS will satisfy all of the functional requirements previously outlined.

System Description

OADSS is a very broad-based effort that does not center upon development of one large, new system. That is, OADSS can conceptually be viewed as an integration effort where a variety of deficiencies in the current assignment system are addressed. Every effort will be made to integrate OADSS with existing Marine Corps AISs both to prevent duplication of effort and to link now divergent systems. Utilization of the system will be modular (i.e., entered at the sub-system level) rather than sequential. While the main emphasis of the proposed system is upon providing Monitors with user-friendly means of querying an expanded scope of data elements, modules such as OSGM Interactive Maintenance and SEP Coordinator are targeted at needs that are equally critical. All OADSS modules will be developed on a prototype basis, tested, and refined as needed. Transition to full system implementation is contingent upon prototype performance and utility. The following paragraphs briefly highlight how the proposed individual modules will meet user requirements.

The SEP Coordinator module will facilitate better tracking of SEP Officers, promote better match of officers to SEP billets, and automate management of the SEP population, which is currently done completely manually. The associated data bases will contain information about both SEP billets and the SEP officers, thus "marrying" data now resident in two separate sources. User-friendly, menu-driven procedures for querying the data base, retrieving officer records, and printing summary reports for management will be provided. Also, procedures will be developed to forecast shortfalls/surpluses in MOS categories to be

considered when deriving yearly selection quotas for the SEP Program. This forecasting will significantly improve a procedure that is now essentially a "best guess" effort based upon limited information.

Derivation of OSGM staffing goals is theoretically, if not functionally, the first step in the assignment process. However, Monitors' input to the OSGM Dictionary File is often not well considered and plagued by errors. The development of a computer-based interactive method for Monitors to update their portion of the Dictionary will promote better input by providing on-line feedback (e.g., error messages, faulty assumptions, etc.). In addition, replacement of the manual procedures now used will save hundreds of man-hours each quarter and greatly reduce the level of effort required of the OSGM Officer to conduct a model run. The major responsibility of the OSGM Officer will be to review Dictionary modifications (which will be flagged but not actually used for an on-line Dictionary update) and to approve/disapprove each change. Development of this module will require Monitors to get more involved in Dictionary maintenance and will subsequently yield more valid staffing goals.

In concert with the effort to expand the scope of computer-based data elements associated with officer assignment, Monitors will gain access to the promotion history of Marine Corps officers. This information has recently been placed on a microcomputer-based LAN in MMPR and its availability will assist Monitors to predict probability of promotion. The "Blue Book" information now used provides little more than lineal control number data. Access to this supplemental information will be provided on a read-only basis and access will be tightly controlled by the DBA.

Annual Slate Letters, sent only to officers with the rank of Major and above (i.e., field grade), are an important source of assignment-relevant information. Unfortunately, because this input is not now computer-resident, utilization of the information has been limited at best. The manual processing of large numbers of Slate Letters is often simply too time consuming to be productive. The development of methods to enter the information in the computer, conduct queries of the data easily and quickly, and generate simple reports will prove quite beneficial. Computer-based access to duty preferences, information about dependents, educational history, etc. will lead to a more thorough review of critical factors in the assignment process. In addition to automation of the ASL, an opportunity will be provided for Monitors to enter lengthy, assignment-related notes about each constituent. This capability is needed because the size of the "Notepad" section on the OSF is too confining for extensive comments. By providing the opportunity to enter detailed notes, the elimination of haphazard, unreliable note-taking will result.

Improving Monitors' ability to easily access an expanded scope of data elements is the major emphasis of the proposed system. Developing these procedures will eliminate much of the labor-intensive processing now required and will relieve Monitors from their clerical workload. The current mainframe DBMS, ADABAS NATURAL, is not particularly user-friendly. Hence, most Monitors rely on paper-and-pencil practices rather than making use of computer-based assignment aids. Introduction of a DBMS with an applications generator will allow Monitors to access data elements quickly and easily. In association with the development of this module, the number of computer-resident data elements will be expanded. That is, the OADSS data base will include information that now exists only in hard copy form or not at all.

As discussed in the prior Needs Assessment (Chatfield, 1988), training of Monitors is non-comprehensive and poorly structured. There is a critical need for development of computer-based training of Monitors that will prepare them for their role and attendant responsibilities. The final module currently planned entails developing Computer-Aided Monitor Training (CAMT) that will provide on-line training about Marine Corps staffing policies, OSGM philosophy and Dictionary maintenance, OADSS data base access and report generation, etc. CAMT training will be completed by MMOA personnel during their first 2 weeks at MMOA to provide a knowledge base that is now missing. This training will promote consistency among Monitors in "assignment styles" and will allow them to get accustomed to using VDTs and computer-based methods. In addition, follow-up refresher training will be available so that Monitors can later re-familiarize themselves with key concepts and test their knowledge of assignment-related topics.

Figure 4 illustrates how the four sections within MMOA will be affected by OADSS implementation. While the SEP Coordinator module will be utilized only by MMOA-3, the other modules will be of benefit to nearly all sections. Clearly, the proposed system will have a major impact on the way in which assignment procedures are conducted.

Module	MMOA Sections[1]			
	MMOA-1	MMOA-2	MMOA-3	MMOA-4
SEP Coordinator Data Base			√	
OSGM Interactive Maintenance	√	√	√	√
Officer Promotion Data	√	√	√	√
Annual Slate Letter/Monitor Notes	√	√		√
Improved Data Base Access	√	√	√	√
Automated Monitor Orientation Sub-system	√	√	√	√

[1]
MMOA-1 Ground Officer Assignment
MMOA-2 Aviation and Aviation/Ground Officer Assignment
MMOA-3 Plans, Policy, Systems, and Special Programs
MMOA-4 Air and Ground Colonel Assignment

Figure 4. Projected utilization of OADSS by MMOA sections.

System Functions

The major functions of the proposed system are discussed below as they relate to satisfying requirements previously stated.

1. On-line Edit/Update of OADSS Data base--The system will provide user-friendly means of adding, editing, and deleting information in the OADSS data base. However, it must be noted that some fields will be designated "read only" as they are updated by other mechanisms (e.g., HMF with diary entry procedures).

2. Simplified Data Base Access--The current mainframe DBMS, ADABAS NATURAL, is not particularly easy to learn and use. Indeed, most Monitors have not been willing to devote the time and energy necessary to become proficient with NATURAL syntax. OADSS will provide a DBMS employing applications generator technology to promote ease of data base access. This DBMS will enable Monitors to conduct ad hoc queries and generate reports in an interactive manner. The applications generator will build the program as Monitors respond to questions presented. In this manner, any user can conduct even very complex queries without learning DBMS syntax. Data base access will also be provided to any mainframe-resident data bases (e.g., HMF) that are of benefit to Monitors.

3. Computerization of Additional Data Elements--Several sources of important assignment-related information exist only in hard copy format. The only way to access this information is with labor-intensive, manual effort. A key function of OADSS will be to make some of these critical data elements computer-resident. For example, by "automating" Slate Letter input, Monitors will have DBMS access to this information. By expanding the scope of computerized data elements, Monitors will be able to make better, more informed assignment decisions.

4. Interactive OSGM Dictionary Maintenance--Monitors' input to the OSGM is in the form of entries to the Dictionary File. By establishing substitution criteria and other billet factors, Monitors have a major impact on the staffing goal solution. Unfortunately, collection of Monitors' input is a time-consuming, hard copy-oriented exercise. To compound the problem, Monitors do not make this task a high priority so their input is often questionable. One of the OADSS modules will entail developing on-line procedures for Monitors to use in maintaining their section of the Dictionary. Additionally, data entry rules and verification schemes will be provided to ensure that their input is acceptable. This function will ease the burden of the OSGM Officer, improve Monitors' understanding of OSGM procedures, and lead to derivation of more accurate staffing goals.

5. Computer-based Training--Training materials and programs for Monitors are noncomprehensive and inconsistently implemented. Not enough structured training is initially provided to Monitors and any type of refresher training is nonexistent. One OADSS module will focus on developing prototype methods for computer-based training; Computer-Aided Monitor Training (CAMT). CAMT covers such topics as delineation of a Monitor's responsibilities, application of HQMC staffing policy, and computerized access to assignment-related information. In addition, refresher training will be available so that experienced Monitors can review procedures and test their knowledge base.

Accuracy and Validity

Accuracy and validity considerations for the proposed system are discussed below:

1. Accuracy Requirements of Mathematical Calculations--All calculations involving addition and subtraction (integer) calculations will be 100 percent accurate. Calculations involving multiplication and division will be correct to several decimal places but some rounding error is likely. For consistency, the rounding procedure is that "5 and up" will be rounded to the next highest number. The level of accuracy for these mathematical calculations is well within acceptable tolerance levels for officer assignment requirements.

2. Accuracy Requirements of Data -- OADSS will verify input as a standard procedure. These edit checks will be applied to ensure that: (a) data entries match their respective field types (e.g., numeric fields contain numeric data); (b) data entires fall within a specified range of values; and (c) "required" fields

contain data. In addition, codes for selected fields (MOS, MCC, etc.) will be validated against values contained in DBMS tables.

Timing

Timing considerations for the proposed system are discussed below:

1. Throughput Time--Due to the nature of the assignment process, it is impossible to gauge precisely how long a Monitor spends "working" an assignment. Review of data elements, interaction with constituents, and other activities are typically spread over several weeks. However, by replacing much of the manual, labor-intensive work with automated procedures, the throughput time for an assignment should be reduced by at least 50 percent.

2. Response to Queries and Updates of Data Files--Response time to queries will be affected by several factors; among them are response time of the computer system, number of users concurrently on-line, type of query (for example, sorts are very CPU-intensive), location of data base being accessed, layout of the data base, user's priority in the operating system, and efficiency of the program being run. While an accurate estimate of response time cannot be reached, it is assumed that queries of medium complexity will be completed in less than one minute. Updates of data files will be consistently much faster, requiring from 5-10 seconds to complete.

3. Priorities Imposed by Types of Inputs and Changes in Modes of Operation--The nature of the assignment process does not require immediate on-line update of officers' records. For the most part, daily updates will be sufficient. Priorities on system utilization will center on responding to respondents' telephone inquiries (ad hoc query is required) and producing time-critical management reports.

4. Timing Requirements for the Range of Traffic Load Under Varying Operating Conditions--System response time decrement under periods of heavy user demand is anticipated. The Monitor activity most impacted by this delay will be time-critical ad hoc query. However, many other Monitor activities are not particularly time-sensitive and will not be sensitive to system response degradation.

Flexibility

The system will be designed with maximum flexibility in mind. Every effort will be made to provide a system that can adapt to changing operational requirements, interact with existing AISs, and be amenable to system modification. Procedures intended to ensure this flexibility are discussed below:

1. Use of a standardized Data Dictionary for defining system data elements, system definitions, and entity relationships.

2. Development of the system using a module approach, each being a subsystem of manageable size.

3. Use of commercially available DBMSs and DoD-approved programming languages so that the Marine Corps can readily maintain applications software.

4. Development of well structured and well documented applications programs to facilitate maintenance.

5. Publication of LCM documentation (Operations Manual, Users Manual, etc.) so that planned changes are noted.

6. System design that will provide an interface with REAL FAMMIS and existing Marine Corps AISs. A structured analysis and design approach will be used for this purpose.

System Data

A large portion of OADSS data will be drawn from JUMPS/MMS, the HMF, and the OSF. The "new" data elements (e.g., Annual Slate Letter/Monitor Notes) to be available in the OADSS data base will, for the most part, be entered by MMOA personnel. In addition to these data sources, it is anticipated that Monitors will continue to refer to FREDS, MBSs, and "Tickets" for supplemental information. As OADSS is designed principally as a data base query system, there are no major outputs. While Monitors will use OADSS to perform ad hoc queries and generate reports, limited formalized output is anticipated. That is, the output produced will vary with the action initiated by the user.

Inputs

As mentioned above, OADSS data will be primarily extracted from JUMPS/MMS, HMF, and OSF files. The data elements in these files that are planned for inclusion in the OADSS data base will be included in the Data Dictionary of the next report in this series (Data Requirements Document). The best way in which to summarize system data inputs is by referring to the proposed format for Data Dictionary entries. Information to be provided includes the following:

1. Data Element Name -- long name
2. Synonymous Name (or "Alias") -- short name
3. Field Length -- number of bytes required for storage
4. Data Type -- Alphabetic, Numeric, or Alphanumeric
5. Monitor Updatable -- yes or no
6. Edit Rules -- for data verification
7. Description -- Full description of data element
8. Source -- OSF, HMF, MMOA, HQMC, OSGM

Outputs

As discussed above, there is limited formalized system output. The DBMS will have sufficient flexibility to search and report on officer data in just about anyway that the Monitor would like. OADSS does not need to produce formalized output as it is designed to support Monitors' decision-making, not automate the assignment process. The only consistent, structured output from the system will be the OSGM Dictionary that will be interactively updated.

Data Base

The OADSS data base will reside on disk packs on the AMDAHL 470/V8 (running MVS and TSO) mainframe computer located at the MCCDPA, Quantico. As discussed earlier in this document, OADSS is essentially an attempt to integrate existing Marine Corps AISs from the Monitors' perspective. Hence, it is often problematic to draw a clear dividing line between OADSS and these other AISs. For example, for the purposes of the Data Dictionary, only those data elements (from other AISs) that are perceived to be of value for officer assignment are included. The bulk of the OADSS data base will be comprised of the OSF, selected HMF data, and "new" data for the Annual Slate Letters, promotions history, and the OSGM Dictionary file. Overall, these sources will provide Monitors with a comprehensive history (prior assignments, promotion history, duty preferences, etc.) of officers to be considered in weighing assignment alternatives.

User passwords will be issued to control access to the OADSS data base. In addition, data base security will be available at the file, field, and value within field levels. The number of records in the data base is based upon the total number of active duty officers in the Marine Corps. At present, this number is slightly in excess of 20,000. Other portions of the data base will have a different number of records. For example, the OSGM Dictionary File that will be interactively updated contains only about 10,000 records.

HMF data elements will be updated on a weekly basis through the unit diary process of JUMPS/MMS. Nearly all of the other data elements will be updated on an "as needed" basis (see Appendix C of the subsequent Life Cycle Management document, "Development of a USMC Officer Assignment Decision Support System: Data Requirements Document." On-line update of OADSS data elements,

including the OSF, will ensure that Monitors' continually have access to the most current information. An officer's record will be maintained in OADSS until the individual is no longer on active duty.

ENVIRONMENT

This section details the current ADP environment and the proposed system environment needed to satisfy requirements identified in the preceding two sections.

Equipment Environment

OADSS will be designed to run in the existing ADP environment; centralized processing on an AMDAHL 470/V8 resident at the MCCDPA, Quantico. The mainframe (running MVS/SP - Version 1.3.4 and TSO) will be used to store/maintain the data base and to host the DBMS used for ad hoc query and reporting. Recommendation of this feasible alternative (see Feasibility Study (Chatfield and Gullett, 1989)) was based primarily upon the assumption that several planned near-term enhancements will be made to the mainframe environment. For example, recently an IBM 3081 was installed with a central processing capacity of 64 megabytes and 20 MIPS capability. Addition of a second IBM 3081 within the next few months is planned as well. Such major system ADPE enhancements should go far toward providing improved system response time that is so critical for successful system implementation.

The only new ADPE to be purchased is two complete microcomputer systems. These IBM-compatible machines will be used for prototype development and testing of the SEP and CAMT modules. While the SEP module will likely transition to the mainframe, CAMT may best remain available in a stand-alone mode. Requirements for the two microcomputer systems are outlined below:

1. 640 KB of Random Access Memory (RAM)
2. 20 MB Internal Hard Disk
3. 360 KB Floppy Disk Drive
4. Monochrome Monitor
5. Graphics Capability
6. Bisynchronous Communications Adaptor
7. Near Letter Quality (NLQ) Dot Matrix Printer

Support Software Environment

System and application software for both the mainframe and microcomputers will be required. Mainframe system software requirements include an operating system, a user-friendly DBMS with applications generator, utilities, telecommunications, and system security. Under the assumption that FOCUS (paired with PC/FOCUS) will be acceptable as the DBMS, all of the aforementioned software is presently available at the MCCDPA, Quantico.

Development of new applications software will be minimal; except for DBMS application programs. The source code for any applications developed will become the property of the U.S. Marine Corps. System software requirements for the microcomputers include an operating system, telecommunications, utilities, PC version of the mainframe DBMS, and program language compilers (e.g., BASIC, COBOL). To ensure timely utilization, all software will be purchased concurrently with the ADPE purchases. All applications software developed will become the property of the U.S. Marine Corps.

Interfaces

OADSS will interface with the following systems/sub-systems currently extant:

1. JUMPS/MMS (via the HMF)--OADSS will interface with JUMPS/MMS, an integrated pay and personnel system maintained by the MCCDPA, Kansas City, via the HMF. Specifically, on-line access to the HMF, maintained by the MCCDPA, Quantico, will allow Monitors to have "read only" access to selected

JUMPS/MMS data elements. The HMF is a weekly extract of the JUMPS/MMS so data are fairly current. Procedures for creating and loading the HMF onto the AMDAHL will not be changed by OADSS.

2. TMR--The Table of Manpower Requirements (TMR) is a Class 1 system that contains two major files: the Master File containing T/O line numbers, and the Unit File containing information about mapping of units to T/Os. Data from this system is required for the SEP Coordinator module. Transfer of data will be carried out manually in the prototype phase with some planning given to automating the process if the module later transitions to the mainframe.

Summary of Impacts

This paragraph details the anticipated organizational, operational, and developmental impacts of OADSS on the ADP organizations of the U.S. Marine Corps. For all practical purposes, only one ADP organization is actually affected by OADSS; the MCCDPA, Quantico.

ADP Organizational Impacts

1. Addition/Modification of Personnel Responsibilities--Implementation of OADSS will create only a limited number of new responsibilities for the MCCDPA, Quantico, organization. Only two new roles are required: an Applications Programmer to assist MMOA with developing DBMS programs and a MMOA Liaison to coordinate telecommunications, file maintenance, etc. Both of these positions are critical and should be assigned only to experienced personnel. These positions are further detailed below:

a. Applications Programmer. At least one person should be responsible for software maintenance and development after OADSS is in place. This individual will work closely with NPRDC and MMOA in structuring the OADSS data base and producing initial DBMS applications. After successful implementation, the Applications Programmer will be responsible for creating, testing, and documenting any additional applications programs.

b. MMOA Liaison. Because of the geographical separation of MMOA and the MCCDPA, Quantico, close cooperation between the two sites is imperative. The MMOA Liaison will work closely with the OADSS DBA to assess needs, coordinate telecommunications, initiate action by the Applications Programmer, and a variety of other tasks. In addition, this individual will assist and advise MMOA with regard to procurement of additional software. All other personnel responsibilities at the MCCDPA, Quantico, will remain essentially unchanged as will support for MMOA in other capacities.

ADP Operational Impacts

Once OADSS is developed and successfully implemented in the mainframe environment, ADP operational impacts are negligible. Other than the Applications Programmer and MMOA Liaison positions, MCCDPA personnel will be unaffected by the proposed system. While it is possible that some personnel will occasionally be called on to help write DBMS applications programs, assist with data base modification, and other such tasks, this will not be a routine event.

ADP Development Impacts

The MCCDPA will be involved with OADSS in its development and testing as well as responsible for its routine operation. While actual development and implementation of the system is the responsibility of NPRDC (and any NPRDC-selected contractors), involvement of MCCDPA, Quantico, personnel is inevitable. This is primarily because OADSS will be introduced into the existing mainframe environment and a new data base is being built. Close involvement of NPRDC, MMOA, and the MCCDPA during the development stage will help in the transition to the ADP staff after project completion. In addition, knowledge gained by MCCDPA personnel in design and implementation of the new system will prove beneficial for subsequent system maintenance responsibilities. Another reason for ADP personnel involvement is to ensure that the system design and implementation is consistent with Marine Corps policy.

During the implementation phase of OADSS, system access, disk space, and sufficient central processing time will be required for developing and testing OADSS modules. In addition, some effort will be required for transferring existing data elements to the OADSS data base or for reading existing files with the DBMS. Specific computer resource requirements will be established at a later stage of the project.

Failure Contingencies

This section details possible failures of the hardware/software components of the system, the consequences of these failures, and alternative courses of action that may be pursued to satisfy user requirements.

1. Restart--Restart capabilities for the proposed system will be essentially the same as for existing data base access using ADABAS NATURAL. The DBMS should have "restart" functions built in so that processing can continue from the point of termination rather than reinitiating the action. Audit trails will be used during on-line data base access so that data entered subsequent to the most recent system back-up will not be lost. Procedures for routine file backup and system maintenance will continue as is currently done. Efforts will be made to avoid system/file maintenance during peak work periods. MMOA involvement with backup procedures will be minimal as files will reside on the AMDAHL mainframe.

Security

Security for the OADSS system will be provided at four levels: system, file, field, and value within field. The security software known as TOP SECRET (TS) will be used to control access to the AMDAHL (system security). All other levels of security will be provided by the DBMS software selected. It should be noted that FOCUS has all four of the required security features.

COST FACTORS

The previous Feasibility Study (FS) and Economic Analysis (EA) documents presented alternative approaches to system development. This section briefly describes the key points of the FS and EA findings but does not provide the same level of detail. For additional information refer to these documents.

Alternatives

Four alternatives were evaluated for potential OADSS application:

Alternative 1: Existing System--Utilization of the present mainframe environment.

Alternative 2: Existing System Enhancement--Major enhancements to the mainframe machine; both in CPU power and file storage.

Alternative 3: Distributed Processing, Minicomputer--Procurement of a minicomputer dedicated to MMOA needs.

Alternative 4: Distributed Processing, Microcomputer--Installation of a microcomputer-based Local Area Network (LAN) within MMOA.

The recommended course of action was to use an enhanced mainframe environment, Alternative 2. While Alternative 3 might be the "ideal" choice, there are potential problems with equipment acquisition and an insufficient number of qualified personnel in MMOA to run the minicomputer system. By selecting Alternative 2, these problems are avoided and the development of OADSS will not be impaired. Hence, development of this Functional Description was based on the assumption that Alternative 2 will be the operating environment for the proposed system.

Costs

Elements used in the cost analysis were divided into three cost categories: (1) "sunk", (2) nonrecurring, and (3) recurring.

1. Sunk Costs--The FS and EA discussed a number of "sunk" costs not used in comparing feasible alternatives. Among them are existing MCCDPA ADPE, concept or system development costs incurred to date, and in-house Marine Corps labor costs.

2. Nonrecurring Costs--Nonrecurring costs are divided into three categories: (1) hardware purchases, (2) software purchase and development, and (3) communications.

3. Recurring Costs--Recurring costs are divided into the same three categories as nonrecurring costs. However, these costs are primarily associated with operation and maintenance of hardware/software once the system is implemented.

4. Additive Costs--This category examines cost comparisons not simply based on gross dollar figures. Cost figures presented are from the EA.

a. Net Present Value--The net value analysis compared the two feasible alternatives in terms of discounted dollars. A discount rate of 10 percent and a differential inflation rate of 10 percent were used in the analysis. Results indicated that Alternative 2 ($134,844) was much more economical than Alternative 3 ($272,160).

b. Benefit-to-Cost Ratio (BCR). To evaluate the feasible alternatives in other than a purely monetary sense, comparative analysis of anticipated major benefits was undertaken. Each benefit was assigned a relative weight to translate findings into a form appropriate for statistical evaluation. Results indicated that the resulting BCR for Alternative 2 (1.60) was far superior to that of Alternative 3 (.94). While Alternative 3 yields 18.2 percent greater benefits, it requires approximately twice the average annual expenditure to maintain the system and is therefore not cost-effective.

RECOMMENDATIONS

The following recommendations are made:

1. A Data Requirements Document (DRD) and associated Data Dictionary (DD) should be completed as the next stage in the "definition and design" phase of system development.

2. A "rapid prototyping" approach to sub-system development should be undertaken as means of minimizing system development time and ensuring the active participation of end users.

3. The DBMS software selected should be available for use on a variety of hardware platforms (i.e., mainframes, minicomputers, and microcomputers). This will promote system flexibility and ensure that programming will be as machine-independent as possible.

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APPENDIX

TERMS AND ABBREVIATIONS

TERMS AND ABBREVIATIONS

ABGRD	Assigned Billet Grade
ABMOS	Assigned Billet Military Occupational Specialty
ACIP	Aviation Career Incentive Pay
ADABAS	Adaptable Data Base System
ADP	Automated Data Processing
ADPE	Automated Data Processing Equipment
ADS	Automated Data System
AFRS	Automated Fitness Report System
AIS	Automated Information Systems
AMOS	Additional Military Occupational Specialty
AOWP	Automated Order Writing Process
ASR	Authorized Strength Report
BMIS	Billet Monitored Command Code Identification Set
BOD	Billet Officer Description
CDC	Control Data Corporation
CMC	Commandant of the Marine Corps
CSR	Command Staffing Report
DBA	Data Base Administrator
DBMS	Data Base Management System
DFD	Data Flow Diagram
DMOS	Duty Military Occupational Specialty
DoD	Department of Defense
DONACS	Department of the Navy Office Automation Communications System
EA	Economic Analysis
FD	Functional Description
FITREP	Fitness Report
FMCC	Future Monitored Command Code
FREDS	Flight Readiness Evaluation Data System
FS	Feasibility Study
GDSS	Ground Combat Service Support
HMF	Headquarters Master File
HQMC	Headquarters, U.S. Marine Corps
HTF	Headquarters Table File
JUMPS/MMS	Joint Uniform Military Pay System/Manpower Management System
KB	Kilobyte
LAN	Local Area Network
LCM	Life Cycle Management
LCM-AIS	Life Cycle Management of Automated Information Systems
LCN	Lineal Control Number
M	Code for Deputy Chief of Staff for Manpower
MAC	Monitor Activity Code
MB	Megabyte
MBS	Master Brief Sheet
MCC	Monitored Command Code
MCCDPA	Marine Corps Central Design and Programming Activity

MCDN	Marine Corps Data Network
MCO	Marine Corps Order
MCPS	Marine Corps Promotion System
MID	Military Identification Number
MIPS	Million Instructions Per Second
MM	Code for Personnel Management Division
MMEA	Code for Enlisted Assignment Branch
MMOA	Code for Officer Assignment Branch
MMOA-1	Code for Ground Officer Assignment Section
MMOA-2	Code for Aviation and Aviation/Ground Officer Assignment Section
MMOA-3	Code for Plans, Policy, Systems, and Special Programs Section
MMOA-4	Code for Air and Ground Colonel Assignment Section
MMOS	Code for Operations and Support Branch
MMPE	Code for Performance Branch
MMPR	Code for Promotions Branch
MMRB	Code for Records Branch
MMS	Manpower Management System
MOS	Military Occupational Specialty
MPI	Code for Manpower Management Information Systems Branch
MPI-40	Code for Manpower Systems Integration and Procedures Section
MVS	Multiple Virtual Storage
NA	Navel Aviator
NAFW	Naval Aviator Fixed Wing
OADSS	Officer Assignment Decision Support System
OCS	Officers Candidate School
OJT	On the Job Training
OM	Computer Operations Manual
OSF	Officer Slate File
OSGM	Officer Staffing Goal Model
PC	Personal Computer
PCS	Permanent Change of Station
PMCC	Present Monitored Command Code
PMOS	Primary Military Occupational Specialty
PMP	Project Management Plan
PREPAS	Precise Personnel Assignment System
RS	Requirements Statement
RUC	Reporting Unit Code
SAS	Statistical Analysis System
SEP	Special Education Program
SPL	Staffing Precedence Level
T/O	Table of Organization
TMR	Table of Manpower Requirements
USMC	United States Marine Corps
VDT	Video Display Terminal

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